

The following newspaper extracts in relation to the forecasts and warnings generally are given as of interest in this connection:

Record, Cleveland, Tenn., February 25, 1898.—The weather predictions sent to this office by the U. S. Government have been unusually beneficial this winter. There has been so little cold weather that farmers scarcely know when to save their pork, and weather predictions became very necessary. The predictions are received every day about 9:45 a. m.

Pensacola, Fla., News, February 11, 1898.—The weather service is regarded with the deepest interest by all citizens and cognizance is taken of every inaccuracy.

It is especially gratifying to state that during the past month, January, not a single imperfect forecast was issued from our local office. Considering the large maritime interests of Pensacola, which depends upon the accuracy of weather predictions, this is worthy of special mention. Where good and faithful work has been done it should be commended.

Our Weather Bureau has grown to be such an institution that we, as a nation, would not only feel its loss, but be almost at sea in our daily routine of life without it.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

There were 10 high and 8 low areas sufficiently well defined to be traced during the month. The paths will be found on Charts I and II, and the principal facts as to appearance, disappearance, duration, and velocity are given in the accompanying table.

HIGHS.

The principal locus of high areas was to the north of Montana, where 7 out of the 10 were first noted. The remaining three originated in the lower Missouri Valley. Numbers VII and VIII were last seen to the north of Lake Superior, and the other 8 could be traced to the Atlantic. The weather conditions have been remarkably mild. Only one cold wave of any severity was experienced, and that only in the Mississippi Valley as high area VII moved across Montana. The fall in temperature in twenty-four hours on February 17, a. m., was 34° at Miles City. On the evening of the same day the area of fall of 32° covered eastern Kansas. The morning map of February 18 showed a fall of 34° at St. Paul.

LOWS.

Five low areas were first noted off or near the north Pacific Coast. Nos. II and III had their origin north of Montana, and VII on the south Pacific Coast. No. VI was last

seen in the lower Lake Region, and the remaining 7 disappeared off the north Atlantic Coast or else in the St. Lawrence Valley.

As low area No. XII of January reached the northeast coast it caused the highest winds of the month, namely, 71 miles an hour at Nantucket, and 70 at Woods Hole, a. m. of February 1. A wind of 68 miles was noted at Cleveland p. m. of 15, as low area No. IV passed to the eastward. The lowest pressure of the month 28.80 inches occurred at Portland, Me., as this same low area passed up the Atlantic Coast a. m. of the 16th. As low area No. VII approached the northeast coast, p. m. of the 20th, a wind of 68 miles was reported from Block Island.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.							<i>Miles.</i>	<i>Days.</i>	<i>Miles.</i>	<i>Miles.</i>
I.....	31, p. m.*	42	98	2, a. m.	33	84	3, 970	1.5	647	27.0
II.....	1, a. m.	52	114	4, p. m.	46	59	3, 680	3.5	1, 052	43.8
III.....	4, p. m.	42	102	10, p. m.	36	78	3, 970	6.0	662	27.6
IV.....	8, p. m.	52	109	11, p. m.	42	69	2, 380	3.0	793	33.0
V.....	11, p. m.	37	102	13, p. m.	32	84	1, 640	2.0	820	34.2
VI.....	14, p. m.	53	110	18, a. m.	40	72	2, 370	3.5	677	28.2
VII.....	16, p. m.	51	116	19, p. m.	49	81	1, 560	3.0	520	21.7
VIII.....	19, a. m.	50	114	22, p. m.	50	58	1, 800	3.5	514	21.4
IX.....	22, a. m.	55	113	27, a. m.	50	86	1, 590	5.0	318	13.3
X.....	26, p. m.	49	109	1, p. m.†	37	73	2, 400	3.0	800	33.3
Total.....							22, 360	34.0	6, 803	.....
Mean of 10 tracks.....							2, 236	.....	680	28.3
Mean of 34 days.....								.....	658	27.4
Low areas.										
I.....	1, a. m.	51	97	3, a. m.	46	74	1, 110	2.0	555	23.1
II.....	2, p. m.	47	127	5, p. m.	48	72	2, 920	3.0	973	40.5
III.....	5, a. m.	51	110	13, p. m.	48	53	4, 450	8.5	524	21.8
IV.....	11, p. m.	53	117	15, a. m.	50	68	2, 160	3.5	617	25.7
V.....	13, a. m.	53	121	17, p. m.	49	53	3, 600	4.5	800	33.3
VI.....	15, a. m.	51	124	18, a. m.	42	84	2, 460	3.0	820	34.2
VII.....	17, a. m.	31	112	23, a. m.	41	67	3, 240	6.0	540	22.5
VIII.....	19, a. m.	48	128	28, p. m.	49	60	3, 770	9.5	397	16.5
Total.....							23, 710	40.0	5, 226	.....
Mean of 8 tracks.....							2, 964	.....	653	27.2
Mean of 40.0 days.....								.....	593	24.7

*January, †March.

THE WEATHER OF THE MONTH.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

The statistical aspect of the weather of the month is presented in the tables which form the closing part of this REVIEW. The numerical values in the tables have been generalized in a number of cases, the results appearing on Charts Nos. III to IX, inclusive. Table I in particular contains a variety of details from which the reader may select those most interesting to himself.

PRESSURE AND WIND.

Normal conditions.—The geographic distribution of normal barometric readings at sea level and under local gravity for February in the United States is shown by Chart VIII of the MONTHLY WEATHER REVIEW for February, 1893.

The normal values for February, as compared with those for January, are lower by about 0.05 inch (from 30.20 to 30.15) over the Plateau and Rocky Mountain regions and the South Atlantic Coast States; elsewhere the changes are slight.

The regions of relatively high pressure in February are nearly coincident with those of January (see page 5 of this

volume). The only change is an extension of the western area to the northeastward as regards its position in January; in February it covers southern Idaho, northern Utah, Wyoming, Montana, the Dakotas, Nebraska, and western Minnesota.

Pressure is lowest over the north Pacific Coast and the Canadian Maritime Provinces, whence it decreases to the areas of low pressure occupying the North Atlantic and Bering Sea, respectively.

Northwesterly winds prevail on the Atlantic Coast, and northeasterly or easterly on the Gulf Coast. In northern Texas the prevailing winds are northwesterly, as on the plains, while westerly or southwesterly winds prevail over western Texas. In southern Arizona the winds of winter are northerly, while in central Arizona they may be either southwesterly or easterly.

On the Pacific Coast the winds generally coincide with the direction of the coast line; on the upper half of the coast, say from Eureka northward, southerly or southwesterly winds are most likely to prevail; on the southern half northwesterly

winds are most frequent. The winds of the Rocky Mountain and Plateau regions are variable, southwesterly winds generally prevailing west of the mountains and northwesterly on the eastern slope and the plains beyond. The winds of the middle and upper Mississippi Valley are westerly or northwesterly; westerly winds also prevail in the upper Lake Region, while the winds of the lower Lake Region and Ohio Valley are generally southwesterly.

The current month.—Pressure was above the normal over the greater part of the United States, being 0.05 inch or more in excess at the following stations, viz, Salt Lake City, Idaho Falls, Santa Fe, New Orleans, Mobile, Chattanooga, and Eastport.

Pressure has been above normal in the middle Plateau Region continuously since December last.

Pressure was below normal on the North Pacific Coast and over a portion of the northern slope and upper Missouri Valley, the greatest deficits being 0.13 inch at Tatoosh Island; 0.10 at Havre; 0.09 at Fort Canby, Roseburg, and Rapid City, respectively.

The winds were, on the whole, quite variable. The resultant direction for each station is shown on Chart IV by an arrow which flies with the wind. The numerical values of Tables I and VII should be consulted for further details.

TEMPERATURE OF THE AIR.

Normal conditions.—The normal mean temperature of the air in the United States in February varies from about 71° at Key West, 58° at Jacksonville, 58° at New Orleans, 57° at Galveston, 55° at San Diego to 22° at Eastport, 21° at Burlington, 24° at Buffalo, 26° at Detroit, 14° at Duluth, 1° at St. Vincent, 13° at Havre, 28° at Spokane, and 40° at Seattle, on Puget Sound. The warmest regions, as may be seen from the above figures, are the South Atlantic, Gulf, and Pacific Coast States; the coldest are the Red River Valley of the North and contiguous territory. The Pacific Coast is somewhat warmer than the Atlantic, and both are considerably warmer than the interior.

The differences between the normal temperatures of January and February are small, as may be seen by comparing the above figures with those on pages 5 and 6 of this volume. The greatest increase of heat from one month to the next occurs in the northwest, or near the middle of the continent.

The current month.—The month, like its immediate predecessor, was mild and open. The temperature was below the normal in the South Atlantic States, yet no unusual cold was experienced in that region. The lowest temperatures of the month east of the Rocky Mountains occurred on the 2d and 3d. During this period freezing weather was experienced as far south as Tampa, Fla., and westward along the Gulf Coast to Mobile. Light frost occurred on the east coast of Florida as far south as Jupiter.

The lowest minimum temperature of the month, 33° below zero, was registered in northern New England and Minnesota on the 1st and 3d, respectively.

On the immediate Pacific Coast the temperature did not fall below the freezing point during the month, and in California freezing temperatures were not recorded at any Weather Bureau station, although voluntary observers on the higher levels report a number of such temperatures. The line of zero temperature (Chart VI) crosses the Rocky Mountains in southern Colorado and follows the trend of the main chain into the British Possessions.

The highest temperatures of the month, 90° and over, occurred in the Rio Grande Valley. Maximum temperatures of 80° and over occurred in Florida, Texas, southern New Mexico, Arizona, and California. The lowest maxima, 40° and under, occurred in the Lake Superior region.

The distribution of the observed monthly mean temperature of the air over the United States and Canada is shown by red lines (isotherms) on Chart VI. This chart also shows the maximum and the minimum temperatures, the former by broken the latter by dotted lines. As will be noticed, these lines have been drawn over the Rocky Mountain Plateau Region, although the temperatures have not been reduced to sea level; the isotherms relate, therefore, to the average surface of the country in the neighborhood of the various observers, and as such must differ greatly from the sea-level isotherms of Chart IV.

The average temperatures of the respective geographic districts, the departures from the normal of the current month and from the general mean since the first of the year, are presented in the table below for convenience of reference:

Average temperature and departures from the normal.

Districts.	Number of stations.	Average temperature for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	30.7	+ 3.5	+ 3.7	+ 1.8
Middle Atlantic	12	34.5	0.0	+ 3.1	+ 1.6
South Atlantic	10	46.3	— 3.3	+ 0.9	+ 0.4
Florida Peninsula	7	64.0	— 3.1	— 2.1	— 1.0
East Gulf	7	52.0	— 2.6	+ 1.9	+ 1.0
West Gulf	7	54.2	+ 2.6	+ 8.6	+ 4.3
Ohio Valley and Tennessee	12	36.9	— 1.1	+ 4.2	+ 4.1
Lower Lake	8	27.9	+ 1.4	+ 5.3	+ 2.6
Upper Lake	9	22.6	+ 3.0	+ 8.6	+ 4.3
North Dakota	7	14.7	+ 7.5	+ 22.6	+ 11.3
Upper Mississippi	11	28.7	+ 2.6	+ 10.3	+ 5.2
Missouri Valley	10	30.8	+ 6.4	+ 15.6	+ 7.8
Northern Slope	7	30.1	+ 9.2	+ 14.2	+ 7.1
Middle Slope	6	38.6	+ 6.2	+ 9.8	+ 4.9
Southern Slope	6	46.5	+ 6.0	+ 10.2	+ 5.1
Southern Plateau	13	52.3	+ 3.7	+ 0.6	+ 0.3
Middle Plateau	9	37.9	+ 4.0	— 4.0	— 2.0
Northern Plateau	10	35.8	+ 8.6	+ 6.8	+ 3.4
North Pacific	9	44.6	+ 4.2	+ 5.1	+ 2.6
Middle Pacific	5	51.0	+ 1.8	— 1.0	— 0.5
South Pacific	4	55.8	+ 2.4	— 0.3	— 0.2

In Canada.—Professor Stupart says:

Over the greater part of the Dominion the mean temperature of the month was considerably above average; in fact, the only portions where it was lower than average were northern Alberta and western Saskatchewan, where it was from 1° to 2° below. In Manitoba, northern Ontario, Nova Scotia, and Prince Edward Island the excess amounted to between 6° and 8°.

Review of the season.—Thus far the winter has been one of the mildest experienced for a number of years, except in California and the middle Plateau Region. The weather in Montana and the Dakotas, especially, has been extremely mild. In the Lake Region there has been less ice than usual, and the prospects for an early opening of navigation are good. According to reports received by Section Director Brandenburg, of the Colorado Climate and Crop Service, less snow than usual has fallen in the mountains of that State.

Although considerable snow fell in January in Idaho, Utah, western Wyoming, and Arizona, the amount that fell during February was below the average. On the whole there appears to be less water in sight for irrigating purposes than there was a year ago.

The weather of December and January in California, and generally throughout the Plateau Region, was dry and cold. It is reported that during January ice formed in the Grand Canyon of the Colorado at a depth of from 4,000 to 6,500 feet below the mesa.

PRECIPITATION.

Normal conditions.—The regions of heavy precipitation in February are, as in January, on the north Pacific Coast, the lower Mississippi Valley, Tennessee, and the mountainous regions of North Carolina and Georgia.

The regions of moderate precipitation west of the Rocky Mountains are portions of California, the Puget Sound country, and the Willamette Valley. In the central valleys and the east moderately heavy precipitation occurs in the middle Mississippi Valley, the Lake Region and Ohio Valley, the Atlantic seaboard, New England, and Florida. The regions of scant or variable precipitation are the upper Mississippi and Missouri valleys, the plains west of the one-hundredth meridian, and the Rocky Mountain and Plateau regions. Under normal conditions, therefore, the greater part of the United States lies within the region of moderately heavy rains or snows, aggregating, say, from 2 to 4 inches during the month.

The current month.—The geographic distribution of precipitation for the current month is shown on Chart III.

Three regions of heavy precipitation appear on the chart as follows: (1) the north Pacific Coast, (2) the lower Mississippi Valley, and (3) New England. The precipitation in New England was mostly in the form of snow, as shown by Chart VIII.

The most striking feature of the month was the drought that prevailed in southern Virginia, North Carolina, South Carolina, Georgia, and Tennessee. The rainfall of this region was not more than three-quarters of an inch on the average, less than 50 per cent of the normal fall.

General rains fell over the greater part of California on the 24th, thus terminating what promised to be a very disastrous drought in that State.

Averages and departures by districts are summarized for convenience of reference in the following table:

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		<i>Inches.</i>		<i>Inches.</i>	<i>Inches.</i>
New England	10	5.02	143	+1.50	+2.10
Middle Atlantic	12	2.06	61	-1.30	-2.00
South Atlantic	10	1.90	34	-2.50	-5.20
Florida Peninsula	7	1.49	56	-1.30	-3.50
East Gulf	7	4.15	89	-0.30	-2.80
West Gulf	7	2.19	65	-1.20	-0.70
Ohio Valley and Tennessee	12	1.53	36	-2.70	+0.20
Lower Lake	8	2.56	97	-0.10	+1.10
Upper Lake	9	2.37	127	+0.50	+0.80
North Dakota	7	0.55	73	-0.30	-0.70
Upper Mississippi	11	1.58	80	-0.40	+0.70
Missouri Valley	10	0.96	70	-0.40	0.00
Northern Slope	7	0.21	41	-0.30	-0.60
Middle Slope	6	1.20	150	+0.40	+1.20
Southern Slope	6	1.00	100	0.00	0.00
Southern Plateau	9	0.38	28	-0.90	-0.60
Middle Plateau	13	0.43	41	-0.70	-1.80
Northern Plateau	10	1.42	83	-0.30	-1.10
North Pacific	9	9.25	153	+3.20	+0.10
Middle Pacific	5	4.65	115	+0.60	-3.40
South Pacific	4	0.98	38	-1.60	-3.20

In Canada.—Prof. R. F. Stupart says:

In British Columbia, and eastward across the territories, almost to Qu'Appelle, the precipitation was in excess of average, particularly in Saskatchewan and northern Alberta, where the snowfall was exceptionally great. From Qu'Appelle eastward across Manitoba to Lake Superior there was a general deficiency, ranging from a little less than to about half the average amount. East of this again, in Algoma and Nipissing, and thence southward to Lakes Ontario and Erie, an excess was general, excepting in Frontenac and contiguous counties. In Quebec the snowfall was unusually large, but in the Maritime Provinces the precipitation was nowhere greater than average, and in many parts there was a decided deficiency.

SNOWFALL.

The total snowfall for the current month is given in Tables I and II, and its geographic distribution is shown on Chart VIII. Much snow fell in Wisconsin, Michigan, northern New York, and New England, the depth in the latter averaging over 3 feet in portions of Maine, New Hampshire, and Vermont.

Two unusually severe snowstorms occurred during the month. The first is described by Mr. J. W. Smith, Section Director of the New England Climate and Crop Service, in his January report as follows:

Heavy snow fell all night of January 31-February 1, and the wind attained the velocity of a gale of from 50 to 70 miles per hour from the northeast. On the morning of February 1 New England was completely snow-bound. The snow, which was damp and clinging, together with the wind, completely annihilated overhead wires of all sorts; transportation lines were almost completely blocked and traffic was not resumed with regularity for several days; thousands of suburban residents who earn their daily living in the city of Boston were unable to move from their homes.

The second storm was confined to the States of Iowa, Minnesota, Wisconsin, Michigan, northern Illinois and Indiana, and Ohio.

Mr. W. M. Wilson, Section Director of the Wisconsin Climate and Crop Service, reports upon the storm as follows:

The total snowfall at Milwaukee exceeded 24 inches, and in many places accumulated to a depth of from 10 to 15 feet. All business was more or less interfered with, but the street railway lines suffered the greatest inconvenience. The mail trains were delayed from eight to twenty-four hours, especially from the south and west, and in one instance a train was literally buried by snow which had drifted into a cut. Not since the memorable snowstorm of March 2-4, 1881, has there been a snowstorm of equal severity in this locality.

In its movement to the eastward this storm was attended by rain, hail, and sleet. In some localities the rain froze as it fell, forming a coating of ice several inches in thickness on all exposed objects. Much damage was done to trees and shrubbery of all kinds. In New England the storm was reported as being the most severe of its kind since 1837.

Snow on ground at end of month.—At the end of the month the depth of snow in the Rocky Mountain and Plateau regions was very much less than on the corresponding date a year ago. It was also considerably less than on January 31, 1898, much snow having disappeared in Arizona, Nevada, Utah, Colorado, Wyoming, and Montana. There was practically no snow in the Missouri Valley, and the Ohio Valley below Pittsburg was also free from snow. The snow covering in Maine, New Hampshire, and Vermont at the end of the month was unusually heavy. Depths ranging from 40 to 70 inches were reported in Maine, 10 to 40 inches in New Hampshire and Vermont, and from 10 to 20 inches in Massachusetts. This great body of snow seriously interfered with lumbering operations throughout northeastern New England. The financial loss is placed at not less than \$1,000,000.

In Canada.—Prof. R. F. Stupart says:

In Quebec the depth of snow on the level ranges is between 3 and 5 feet, and in New Brunswick, while there is not a great quantity near the Bay of Fundy, there are from 3½ to 5 feet in the central and northern portions. In Saskatchewan the depth is from 30 to 40 inches, but in Manitoba from 6 to 20 inches is the general report and in southern Alberta there is practically none. In Ontario there is little near Lake Ontario, and especially toward the eastern end.

ICE IN THE RIVERS AND HARBORS AT THE CLOSE OF THE MONTH.

There was a slight increase in thickness of ice in the Lake Region as compared with January 31, 1898. Elsewhere there was a general decrease. The following summary is taken from the Snow and Ice Chart of February 28, prepared by the Climate and Crop Division:

Mississippi River.—River open below bridge at Burlington, Iowa; still blocked above the bridge.

Hudson and Mohawk rivers.—Ice in the Hudson soft; no harvesting along river except behind dikes. No change in condition of ice in the Mohawk River.

Kennebec River.—Ice 17 inches thick.

Connecticut River.—Open to navigation south of Middletown.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 19. Arizona, 18. Arkansas, 19, 26, 27. California, 7, 27. Florida, 19. Indian Territory, 9, 18. Kentucky, 11. Louisiana, 11, 19, 26, 27. Mississippi, 10, 19, 25, 26. Missouri, 19, 25, 26, 27. Nebraska, 9. Nevada, 3, 8, 21. New Mexico, 8. North Carolina, 5, 20. Oklahoma, 8, 9. Oregon, 3, 6, 7, 15, 16, 17, 18, 20, 21. Texas, 2, 10, 18, 26, 27. Washington, 6, 7, 13, 24. West Virginia, 15, 19, 20.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 5, 26, 28. Arizona, 8. California, 27. Connecticut, 14, 15, 20, 21, 22. Georgia, 5, 26. Idaho, 15, 16, 18. Illinois, 4, 17, 18, 19. Indiana, 4, 5, 12, 19, 20. Iowa, 9, 10, 11, 12, 14, 17, 19. Kansas, 9, 10, 18, 19. Kentucky, 4, 5, 15, 20. Louisiana, 2. Maine, 18, 20, 21, 22, 23. Maryland, 8, 15, 18. Massachusetts, 11, 15, 19, 20, 21, 22. Michigan, 4, 9, 10, 20, 21. Minnesota, 6, 10, 20. Missouri, 4, 14, 17, 18, 19, 25. Montana, 13, 15, 16, 21. Nebraska, 4, 8, 9, 10, 14, 15. Nevada, 6, 7, 21, 24, 25. New Hampshire, 5, 6, 15, 16, 20, 21, 22. New Jersey, 14, 22, 23. New Mexico, 18. New York, 5, 14, 18, 19, 20, 21. North Carolina, 17, 18, 20, 27. North Dakota, 6. Ohio, 5, 11, 14, 15. Oklahoma, 18. Oregon, 16, 18, 20. Pennsylvania, 5, 14, 18, 20, 21. South Carolina, 5, 26. South Dakota, 1, 3, 10. Tennessee, 4, 5, 20, 26. Texas, 9. Utah, 6, 7. Vermont, 20, 21, 22, 23. Virginia, 18, 20. Washington, 1, 15, 16, 17, 18, 19, 20, 21, 22. West Virginia, 15, 17, 18, 21. Wisconsin, 15.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 19th, 78; 20th, 77; 9th, 74.

Reports were most numerous from Louisiana, 58; Mississippi, 50; Texas, 45; Missouri, 35; Arkansas, 32; Ohio, 31.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 2d to the 10th, inclusive.

The greatest number of reports were received for the following dates: 17th, 16; 11th, 13; 13th, 12.

Reports were most numerous from North Dakota, 20; Minnesota and Montana, 18 each.

In Canada.—Auroras were reported as follows: Father Point, 13, 17; Quebec, 17; Toronto, 16; Port Arthur, 12, 13; Minnedosa, 10, 11, 16, 20; Medicine Hat, 16; Swift Current, 16, 17, 18, 19; Calgary, 21; Prince Albert, 13, 15, 19. Battleford, 10, 11, 17, 20.

No thunderstorms were reported.

WIND.

High winds and local storms.—Winds of 50 miles per hour or over prevailed on the New England Coast on the 1st, 15-16th, and 20th-23d; also on the south Atlantic Coast on the 15th and 16th, and at sundry other places, as shown by the table below. Although the wind did not reach a velocity of 50 miles per hour in the Lake Region much inconvenience and serious interruption to traffic of all kinds were caused by the high winds and snow on the 1st, and again on the 15th, 20th, and 21st. There were no tornadoes during the month so far as known.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which

also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				Miles	
Block Island, R. I.	1	55	ne.	Eastport, Me.	1	65	ne.
Do.	16	60	nw.	Do.	16	54	e.
Do.	20	65	e.	Do.	22	50	ne.
Do.	21	54	e.	Do.	23	55	e.
Boston, Mass.	1	50	ne.	Hatteras, N. C.	16	52	w.
Canby, Fort, Wash.	5	64	se.	Helena, Mont.	13	50	sw.
Do.	6	62	se.	Knoxville, Tenn.	15	52	w.
Do.	7	54	se.	Lexington, Ky.	15	60	sw.
Do.	11	58	se.	Nantucket, Mass.	21	50	sw.
Do.	11	70	se.	Norfolk, Va.	15	59	nw.
Do.	19	66	se.	Northfield, Vt.	16	54	nw.
Do.	22	64	se.	Tatoosh Island, Wash.	18	54	nw.
Do.	24	75	s.	Do.	20	50	s.
Do.	25	63	s.	Wilmington, N. C.	16	51	w.
Cleveland, Ohio.	15	65	nw.	Woods Hole, Mass.	1	70	nw.
Denver, Colo.	4	53	w.	Do.	16	56	w.

HUMIDITY.

The humidity observations of the Weather Bureau are divided into two series; the first or tri-daily series began in 1871 and ended with 1887; the second or twice-daily series is continuous from 1888 to the present time.

In the present state of knowledge respecting the diurnal variation in the moisture of the air, we are scarcely warranted in combining the two series in a general mean.

The monthly means of the second or present series are based upon observations of the whirled psychrometer at 8 a. m. and 8 p. m., seventy-fifth meridian time, which corresponds to 5 a. m. and 5 p. m., Pacific; 6 a. m. and 6 p. m., Mountain; and 7 a. m. and 7 p. m., Central standard time.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England.	71	+6	Missouri Valley.	74	-3
Middle Atlantic.	63	-1	Northern Slope.	65	-4
South Atlantic.	69	-9	Middle Slope.	63	-3
Florida Peninsula.	74	-8	Southern Slope.	58	-12
East Gulf.	74	-4	Southern Plateau.	41	-7
West Gulf.	74	+1	Middle Plateau.	65	+3
Ohio Valley and Tennessee.	73	-1	Northern Plateau.	75	-3
Lower Lake.	80	0	North Pacific Coast.	80	-5
Upper Lake.	84	+3	Middle Pacific Coast.	77	+1
North Dakota.	76	-5	South Pacific Coast.	71	0
Upper Mississippi Valley.	77	0			

The normal for any district can be obtained by adding the departure to the average of the current month when the current humidity is below the normal (—), and subtracting it when it is above (+).

In using the table by means of which the amount of moisture in the air is computed from the readings of the wet and dry bulb thermometers, the pressure argument has almost always been neglected, an omission that has little significance except for low temperatures and at high stations, such as Santa Fe, El Paso, Cheyenne, and a few others. The failure to apply a correction for the influence of the prevailing pressure on the psychrometer has the effect of making the monthly means of relative humidity at high-level stations too small by quantities ranging from 5 to 10 per cent. In the application of the monthly averages of the table below, or those of individual stations in Table I, to special inquiries, whether in the departments of biology, climatology, or sanitary science, this fact should be kept in mind. It should also be remembered that the hours at which observations in the Rocky Mountain

Plateau Region are made, viz, from 5 to 6 local mean time, morning and afternoon, give approximately the maximum and minimum values for the day; therefore, monthly means calculated from such hours approach more nearly the true mean of the month than is the case on the Atlantic seaboard and in the seventy-fifth meridian time belt.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 21 regular stations of the Weather Bureau by its photographic, and at 47 by its thermal effects. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table IX for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table IX for the stations at which instrumental self-registers are maintained.

The percentage of clear sky (sunshine) for all of the stations included in Table I, obtained as described in the preceding paragraph, is graphically shown on Chart VII. The regions of cloudy and overcast skies are shown by heavy shading; an absence of shading indicates, of course, the prevalence of clear, sunshiny weather. The formation of fog and cloud is primarily due to differences of temperature in a relatively thin layer of air next to the earth's surface. The relative position of land and water surfaces often greatly increases the tendency to form areas of cloud and fog. This principle is perhaps better exemplified in the Lake Region than elsewhere, although it is of quite general application. The percentage of sunshine on the lee shores of the Lakes is always

much less than on the windward shores. Next to the permanent influences that tend to form fog and cloud may be classed the frequency of the passage of cyclonic areas.

The current month.—From Chesapeake Bay southward to the Gulf and westward to the Pacific, including almost all of the territory south of the thirty-fifth parallel, sunshiny weather prevailed the greater part of the time. The southwest was especially clear and bright, there being over 70 per cent of sunshine at all stations. The regions of great cloudiness, and consequently little sunshine, were the north Pacific Coast and the Lake Region. The sunshine in both these regions was about the same as for the preceding month.

The average cloudiness by geographic districts, and the departure from the normal conditions are given in the table below. The mean values have been computed from the numerical data of Table I.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	6.0	+0.5	Missouri Valley	4.7	-0.7
Middle Atlantic	4.8	-0.8	Northern Slope	4.9	+0.1
South Atlantic	3.8	-1.5	Middle Slope	3.7	-0.7
Florida Peninsula	3.5	-1.1	Southern Slope	2.7	-2.1
East Gulf	3.5	-2.0	Southern Plateau	2.8	-0.7
West Gulf	4.1	-1.7	Middle Plateau	5.9	+1.1
Ohio Valley and Tennessee ..	6.1	-0.1	Northern Plateau	6.9	+0.2
Lower Lake	8.0	+1.2	North Pacific Coast	8.0	+1.0
Upper Lake	7.2	+0.9	Middle Pacific Coast	6.2	+1.4
North Dakota	4.7	-0.4	South Pacific Coast	4.0	-0.1
Upper Mississippi Valley ..	5.7	+0.4			

FOREST FIRES.

Numerous forest fires broke out in the South Atlantic States about the middle of the month. No rain had fallen for some time, and the forest and swamp lands were very dry. The fires were fanned by the high southwest winds of the 15th, and spread with great rapidity, notwithstanding the efforts of the citizens to check them. Many buildings, fences, and bridges were burned and much lumber was destroyed, the losses aggregating upward of \$1,000,000. The fires devastated portions of the counties of Moore, Richmond, Cumberland, Union, Bladen, Robeson, Pender, and Sampson in North Carolina; Marlboro, Sumter, Aiken, Berkeley, Darlington, Orangeburg, Colleton, Barnwell, Marion, Chesterfield, Richland, Lexington, Fairfield, Williamsburg, Georgetown, and Florence in South Carolina.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 46.1°, or slightly below normal; the highest was 82°, at Rock Mills on the 12th, and the lowest, 10°, at Madison on the 4th. The average precipitation was 2.10, or 3.35 below normal; the greatest monthly amount, 6.82, occurred at Alco, and the least, 0.39, at Clanton.—*F. P. Chaffee.*

Arizona.—The mean temperature was 50.4°; the highest was 90°, at Buckeye on the 6th, and the lowest, zero, at Tuba on the 3d. The average precipitation was 0.20; the greatest monthly amount, 1.50, occurred at Fort Apache, while none fell at many stations.—*W. T. Blythe.*

Arkansas.—The mean temperature was 45.8°, or 1.6° above normal; the highest was 82°, at Magnolia on the 13th, and the lowest, 7°, at Winslow on the 3d. The average precipitation was 2.08, or 1.82 below normal; the greatest monthly amount, 5.28, occurred at Pocahontas, and the least, 0.47, at Silversprings.—*F. H. Clarke.*

California.—The mean temperature was 49.4°, or 1.6° above normal; the highest was 95°, at Salton on the 26th, and the lowest, 1° below zero, at Bodie on the 9th. The average precipitation was 2.95, or 0.23 below normal; the greatest monthly amount, 22.25, occurred at Upper Mattole, while none fell at several stations.—*W. H. Hammon.*

Colorado.—The mean temperature was 30.7°, or 5.3° above normal; the highest was 77°, at Lamar and Minneapolis on the 16th, and the lowest, 23° below zero, at Rangely on the 10th. The average precipitation was 0.39, or 0.67 below normal; the greatest monthly amount, 2.54, occurred at Ruby, while none fell at several stations.—*F. H. Brandenburg.*

Florida.—The mean temperature was 57.5°, or about 3.0° below normal; the highest was 89°, at Minneota Park on the 19th, and the lowest, 20°, at De Funiak Springs on the 1st. The average precipitation was below normal; the greatest monthly amount, 5.97, occurred at Pensacola, and the least, 0.02, at Myers.—*A. J. Mitchell.*

Georgia.—The mean temperature was 46.5°, or 3.7° below normal; the highest was 83°, at Quitman on the 12th, and the lowest, 5°, at Diamond on the 4th. The average precipitation was 1.09, or 3.81 below normal; the greatest monthly amount, 2.70, occurred at Morgan, and the least, 0.34, at Washington.—*J. B. Marbury.*

Idaho.—The mean temperature was 30.7°; the highest was 69°, at Pollock on the 21st, and the lowest, 18° below zero, at Lake on the 23d.